

South African veterinary bacteriologists

Marijke M Henton

World Association for the History of Veterinary Medicine

44th International Congress

2020.02.28

1850 - 1900

- ▶ Microbial techniques and apparatus were sufficiently developed for practical diagnostic use
- ▶ Unusual animal diseases of Africa studied by Robert Koch and David Bruce as well as others
- ▶ Arnold Theiler arrived in South Africa from Switzerland in 1891, but few farmers would employ him as a veterinarian
- ▶ When smallpox broke out in the mining camp of Johannesburg in 1892, Theiler and his wife Emma prepared an effective smallpox vaccine to augment their income

Emphasis on Bacteriology

- ▶ The success of the smallpox vaccine stimulated Theiler to do the same for animal diseases
- ▶ He was employed as a Government Veterinary **Bacteriologist** at the Veterinary **Bacteriological** Laboratories in 1908
- ▶ This laid the basis for veterinary research at Onderstepoort and the whole country
- ▶ Most of the research effort during the following century was based on diagnosing and developing effective vaccines for unique African diseases
- ▶ High demand for these vaccines from other African countries

Top bacterial vaccine - Anthrax strain 34F



- ▶ Developed by Max Sterne [1905-1997]
- ▶ Unique combination of culture medium and atmosphere to induce a virulent anthrax strain to lose its capsule
- ▶ This resulted in a relatively safe vaccine which gave good immunity
- ▶ The vaccine is still in use all over the world - there was no thought of patenting strains in the 1930's
- ▶ Max Sterne, together with J H Mason, developed new techniques for concentrating clostridial toxins, essential for economic vaccine production
- ▶ Sterne went to England in 1951, to Wellcome Research Laboratories, where he continued his research on clostridial vaccines

Clostridial diseases

- ▶ Arnold Theiler, working on the farm Armoedsvlakte [Poverty Plains] discovered that botulism was due to a phosphorus deficiency which animals self medicated by chewing on bones and carcasses
- ▶ Theiler, together with E M Robinson, P R Viljoen, P J du Toit and others identified the botulinum toxin in 1930
- ▶ J H Mason, H P Steyn and J H R Bisschop produced an effective vaccine, which was refined by B C Jansen in 1976

B C [Ben] Jansen [1921-1987]

Leader - he became the director of Onderstepoort at the age of 40, and the chief director of the Department of Agriculture in 1968, and at the same time was the professor of infectious diseases and the Dean of the Faculty of Veterinary Science

Researched clostridial diseases such as enterotoxaemia, blackquarter and tetanus, resulting in vaccines still being used today



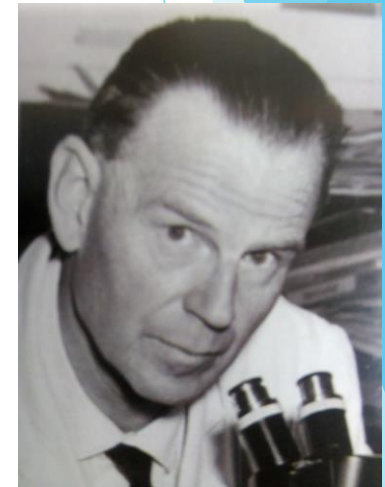
Brucella - Contagious abortion

E M Robinson [1891-1982], initially at Allerton, and from 1922 at Onderstepoort researched *Brucella* at a fundamental level and used the Strain 19 vaccine developed in the USA in a limited way.

G C van Drimmelen improved vaccine production and identified *Brucella ovis* as the cause of infertility in rams, as well as developing an effective vaccine [Rev 1].

George Bishop in Allerton concentrated on the diagnostics of Contagious Abortion, resulting in the near eradication CA [political interference prevented total eradication]

Stan Herr and Andrew Potts did the same at Onderstepoort



Tuberculosis

E M Robinson was followed by Helmut Kleeberg in the 1950's, who collaborated with his medical counterparts to such an extent, that he was appointed the first director of the combined animal and human tuberculosis research unit

H F A K [Hildegard] Huchzermeyer [1929-2019] improved diagnostics and standardized tuberculin production.

A L [Anita] Michel took over when Huchzermeyer retired, and concentrated on ways to diagnose and control TB in wildlife. Many wildlife species had become infected from contact with livestock



1960's onwards

C M [Colin] Cameron, worked at Onderstepoort from 1959-1985, on a broad range of bacteria, both diagnostics and vaccines.

He was respected and well-loved, managed the bacterial section of the vaccine factory, lectured, and had a heavy administrative load.

He had become an adjunct director by the time he left to become the director of the national Department of Health and Population

Rapid turnover of bacteriologists, such as C M E McCrindle, B J Venter, M W Odendaal, M L van der Walt and P Hunter characterized the rest of the century. All these researchers contributed to consolidating veterinary diagnostics and disease prevention



What caused the rapid scientific turnover?

- ▶ Disruption due to wars and government interference
- ▶ Fragmented South African population
- ▶ Poor career prospects in bacteriology
- ▶ Attractive new fields of virology and molecular biology were more popular choices for young researchers

War and government interference

- ▶ The Anglo Boer and both World Wars disrupted research, exacerbated the divide between English and Afrikaans speaking people, as well as the divide between blacks and whites
- ▶ The National Party won the election in 1948, which affected Onderstepoort, as it was totally government funded
- ▶ The National Party had a rural base, so politicians pressurized research towards solving rural concerns
- ▶ Many viral diseases and plant toxins were african, limited research funds were directed to researching these.
- ▶ Bacterial disease problems were considered mostly solved

Government's apartheid policy

- ▶ International research collaboration was limited or non-existent, resulting in slow advancement
- ▶ Political scientific refugees from communist countries and from the very few countries friendly towards the National Party government had to be accommodated
- ▶ Their qualifications varied widely. Some produced excellent results
- ▶ Many were poorly trained, and performed well below expectations. They required time consuming supervision, and used research funds wastefully

Career prospects were poor

- ▶ Advancement in all research posts only lead to administrative posts. Administration became more onerous due to increased demands for frequent reports and complicated financial documents by politicians
- ▶ Poor salaries compared to other branches of government service, universities, other research institutes within South Africa and in other countries
- ▶ Lack of research funds available for bacteriology

Veterinary Education

- ▶ Theiler, in 1920, had insisted that veterinary education should be based at Onderstepoort
- ▶ This led to a rich diversity of knowledge available to students, from all the lecturers, practitioners and researchers based at Onderstepoort
- ▶ The separation between the Onderstepoort Research Institute and the Faculty of Veterinary Science in 1973, the establishment of Medunsa University in 1976, as well as the split between the Institute and the Onderstepoort Vaccine factory all took their toll on the available numbers of dedicated bacterial researchers.

Project Coast

- ▶ Ultra secret military chemical and biological warfare unit, established at Roodeplaat in 1982
- ▶ South Africa did not adhere to its commitment to the Geneva Protocol established at the Biological Weapons Convention of 1972
- ▶ Roodeplaat Research Laboratories was touted as a contract research facility, but was a cover for producing anthrax and clostridial toxins
- ▶ Onderstepoort researchers were lured by promises of interesting research topics, high salaries and extensive funding

Roodeplaat Research Laboratories

- ▶ Research was done on innocuous topics as a cover for the real purpose of Roodeplaat Research Laboratories [RRL], which was preparing biological warfare items
- ▶ RRL disbanded in 1989, after a major security break, when its nefarious purposes became apparent
- ▶ Most veterinary researchers claimed ignorance about the true purpose of the project when it was investigated in 1995
- ▶ Some of the researchers later formed the core of the Bacterial Vaccine Development Unit at the Onderstepoort vaccine factory afterwards, using the experience gained at RRL to improve clostridial and other vaccines

Conclusion

- ▶ The heyday of veterinary bacteriology was therefore during the first half of the 20th century
- ▶ The second half was devoted to consolidation and improvements which are not as illustrious as the early discoveries, but are just as necessary for proper disease control in animals
- ▶ Vaccines for specific African diseases still in high demand